

**Assessment Annotations
for the Curriculum Frameworks**

Science

Grades 3, 7, and 10



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SCIENCE ASSESSMENT ANNOTATIONS

FOR THE

SCIENCE CURRICULUM FRAMEWORKS

The benchmark statements in the Science Curriculum Frameworks are at the second, fourth, eighth, and twelfth grades while the science portion of the Missouri Assessment Project will be given at the third, seventh, and tenth grades. In order to provide assistance in curriculum alignment to administrators, curriculum directors, and teachers concerning what is or is not “fair game” content for the science assessment, the attached document was developed by practicing classroom teachers and administrators.

This document includes the left-hand column (“What All Students Should Know”) and the center column (“What All Students Should Be Able To Do”) from the Science Curriculum Frameworks. The third column contains annotations about each benchmark as provided by several teacher work groups and is intended to provide guidance to **CTB/McGraw-Hill**, the assessment contractor. The first strand of the framework (Scientific Inquiry) was considered fair game at all grade levels and is not included in this document.

In the K-4 range, all of the benchmarks at grade two are “fair game” for assessment at grade 3. The benchmarks at grade four will have the words “Grade 3 state assessment” in the third column to denote a benchmark is “fair game” content or the words “Beyond grade 3 state assessment” to denote a benchmark that will not be considered at grade 3. Likewise, at the 5-8 range, the words “Grade 7 state assessment” or “Beyond grade 7 state assessment” will provide guidance. In the 9-12 range, the benchmarks will have annotations that say “Grade 10 state assessment” or “Beyond grade 10 state assessment.” Some of the annotations will be more specific and are self-explanatory. Not all benchmarks identified here as “fair game” for a state test will show up on the test in any given year.

Also, teacher work groups met in late **1996** and early 1997 to decide which of the seventy-three Show-Me Standards should be assessed on a statewide basis through the science performance assessment instrument. These teacher groups identified the following list of standards:

All of the Science Knowledge Standards

Performance Standards, Grade 3 :	1.3, 1.5, 1.6, 1.8, 1.10, 2.1, 3.5, 4.1
Performance Standards, Grades 7 & 10:	1.1, 1.3, 1.5, 1.6, 1.7, 1.10, 2.1, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 4.1

These standards will be the focus of the performance event of the science portion of the Missouri Assessment Project.

VIII. ECOLOGY----ASSESSMENT NOTES

(Show-Me Standards, Science 4)

A. Interactions

B. Changes

K-12 Content Overview:

Knowledge of the living environment provides students with an understanding of their place in the natural world and of how humans can impact the environment to the benefit or detriment of themselves and other living organisms. Students generally know from everyday experience that, in order to survive, organisms depend **upon other organisms** and the physical **environment** in which they live. But **their** awareness **must** be supported by knowledge of the types of interactions that occur among organisms, the kinds of physical conditions that organisms must cope with, and the complexity of the systems that are created through **interdependence** and interaction.

Living systems maintain a relatively stable internal environment through their regulatory mechanisms. Energy flows through an **ecosystem** from the Earth's primary source of energy, the sun, to organisms that can transform light energy into chemical energy. Other organisms then depend upon this chemical energy, in the form of food, to survive. While energy continually flows to Earth from the sun, matter on Earth is limited. Over periods of time, varying from days to years, matter cycles between the living and nonliving environment.

The concept of evolution provides a framework for understanding the diversity and interdependence of life forms. All ecosystems change over time. Individual organisms that are best adapted to these new **environments** tend to survive and reproduce, leading to shifts in populations. The diversity of behaviors, structure, and biochemical characteristics within a population increases the likelihood that individuals will have characteristics that are beneficial in a changed environment.

VIII Ecology A. Interactions

What All Students Should Know	What All Students Should Be Able To Do	Grade 3 Assessment Notes
<p><i>By the end of grade 2, all students should know that</i></p> <p>1. All living organisms interact with each other and their environment.</p>	<p><i>By the end of grade 2, all students should be able to</i></p> <p>a. give examples of how living things affect their environment and other living things. (1.3; 1.6; 4.1)</p>	Grade 3 state assessment
<p>2. All organisms depend on one another and their environment to live and grow.</p>	<p>a. identify the common basic needs of organisms and the ways in which they depend on each other and their environment. (1.1; 1.2; 1.3; 1.6; 1.10; 2.4; 3.5; 4.6)</p>	Grade 3 state assessment
<p>3. People depend on other living organisms and Earth's resources for clothing, shelter, and food.</p>	<p>a. identify ways man depends on living organisms for food, clothing, and shelter. (1.2; 2.3; 4.1)</p>	Grade 3 state assessment
<p><i>By the end of grade 4, all students should know that</i></p> <p>4. Behavior patterns and survival of organisms result from their interactions with a specific environment.</p>	<p><i>By the end of grade 4, all students should be able to</i></p> <p>a. predict how specific changes in the environment will affect people and other organisms found in this environment. (1.1; 1.3; 2.4; 3.2; 3.4; 3.5; 4.1; 4.6)</p> <p>b. identify behavior and physical adaptations which help organisms adapt to changing conditions. (1.2; 1.5; 2.4)</p> <p>c. identify the physical attributes and behavior of living organisms that enable them to survive. (1.2; 1.5; 2.4)</p>	Beyond grade 3 state assessment
<p>5. Organisms interact with each other as producer/consumer, scavenger, predator/prey, parasite/host, decomposer, etc.</p>	<p>a. identify and discuss mutually beneficial relationships between two or more living organisms. (1.2; 2.3; 2.7; 3.5)</p>	Grade 3 state assessment Assess only producer/consumer

What All Students Should Know	What All Students Should Be Able To Do	Grade 3 Assessment Notes
6. Interactions among organisms lead to a constant flow of matter and energy.	a. describe how organisms within a contained system maintain their relationships over time and what adjustments occur naturally within this system. (1.1; 2.1; 3.1; 4.1) b. develop a food chain to show the energy flow from any organism to another. (1.8; 2.2; 3.5)	Beyond grade 3 state assessment

VIII Ecology B. Changes

What All Students Should Know	What All Students Should Be Able To Do	Grade 3 Assessment Notes
<i>By the end of grade 2, all students should know that</i>	<i>By the end of grade 2, all students should be able to</i>	
1. All organisms, including humans, cause changes in their environments that can be either beneficial or harmful to the organisms in the ecosystem.	a. observe and record environment changes and the reactions of organisms to these changes over time. (1.2; 1.5; 2.4; 3.1; 3.5; 4.1)	Grade 3 state assessment
<i>By the end of grade 4, all students should know that</i>	<i>By the end of grade 4, all students should be able to</i>	
2. Organisms that survive in an environment have developed adaptations that allow the organism to compete for available resources and cope with the physical conditions of their environment.	a. identify positive adaptations of organisms to a given environment which increase chances for survival. (1.3; 1.4; 2.3; 3.5; 4.1)	Beyond grade 3 state assessment
3. Human activities can change the environment in ways that affect the health and survival of all living organisms.	a. explain how human activities can impact the environment in positive and negative ways. (1.1; 1.2; 1.3; 1.4; 1.8; 2.1; 2.7; 3.5)	Beyond grade 3 state assessment
4. Changes in an environment, caused naturally or by man, can be beneficial or harmful to the organisms living in that environment	a. identify changes in an environment as beneficial or harmful. (1.1; 1.2; 1.3; 1.4; 1.6; 1.8; 3.5; 4.1)	Beyond grade 3 state assessment

VIII Ecology A. Interactions

What all students should know	What all students should be able to do	Grade 7 Assessment Notes
<i>By the end of grade 8, all students should know that</i>	<i>By the end of grade 8, all students should be able to</i>	
1. As energy flows through the ecosystem, all organisms must capture the portion of energy available to them and transform it to usable forms.	a. relate trophic levels and food webs to the flow of energy in an ecosystem . (1.4; 1.6; 2.7; 3.5; 4.6) b. trace energy repossessions within specific food chains. (1.4; 1.6; 2.7; 3.5; 4.6)	Grade 7 state assessment
2. Matter is recycled in an ecosystem. The total amount of matter and energy in the system stays the same even though it changes forms and location.	a. relate energy flow and matter recycling to each step of a food web. (1.4; 1.6; 1.8; 2.1; 3.5; 4.6) b. use the second law of thermodynamics to explain the flow of matter and energy through an ecosystem and living systems. (1.4; 1.6; 1.8; 2.1; 3.5; 4.6)	Grade 7 state assessment
3. Abstract concepts of global environment can be applied to complex interactions of the biotic and abiotic factors that affect population and ecosystems.	a. speculate on the environmental changes that would have global impact and discuss the mechanisms by which the changes become global. (1.1; 1.2; 1.3; 2.1; 3.5; 4.6)	Grade 7 state assessment
4. All organisms, including humans , are part of and depend on one global food web that begins with organisms at the bottom of the energy pyramid.	a. apply the knowledge learned to describe several examples of interacting organisms and classify them as beneficial, competitive, or detrimental to each other for survival. (1.7)	Grade 7 state assessment

VIII Ecology B. Changes

What All Students Should Know	What All Students Should Be Able To Do	Grade 7 Assessment Notes
<i>By the end of grade 8, all students should know that</i>	<i>By the end of grade 8, all students should be able to</i>	
1. The variation of characteristics in a population increases the likelihood that some members will survive the physical or biological changes of that system.	a. explain how the variation of organisms within a certain population increases the likelihood of survival of the species . (1.2; 1.3; 1.10; 2.1; 3.8; 4.1)	Grade 7 state assessment
2. The equilibrium of species in an ecosystem changes when environmental conditions change.	a. identify environmental changes that affect the diversity and balance of an ecosystem and suggest alternative approaches that are less intrusive. (1.2; 1.4; 1.9; 2.1; 3.2; 3.3; 3.5; 4.1)	Grade 7 state assessment

VIII Ecology A. Interactions

What All Students Should Know	What All Students Should Be Able To Do	Grade 10 Assessment Notes
<p><i>By the end of grade 12, all students should know that</i></p> <p>1. No two species occupy the same niche in an ecosystem so that different species can coexist and help maintain the stability of that system.</p>	<p><i>By the end of grade 12, all students should be able to</i></p> <p>a. observe and identify competitive and cooperative interrelationships among species of a local ecosystem. (1.1; 1.3; 1.4; 1.6; 2.4; 3.5; 4.1; 4.6)</p>	Grade 10 state assessment
<p>2. Human decisions concerning the use of resources alter the stability and biodiversity of ecosystems.</p>	<p>a. research the methods of obtaining fossil fuels and their impact on ecosystems. (1.4; 1.6; 1.8; 1.10; 3.2; 3.3)</p> <p>b. explain the possible consequences of a reduction in biodiversity. (3.1; 3.2; 3.3; 3.8)</p>	Grade 10 state assessment
<p>3. Increased demand for natural resources require global cooperation and long-term planning to ensure the resource needs of successive generations will be met</p>	<p>a. compare the use of natural resources in developing countries to the use in industrialized nations. (1.2;1.4; 1.7; 2.3; 2.7; 4.1; 4.6)</p> <p>b. discuss how technology has provided a more efficient use of resources and extended their availability. (1.4; 1.7, 2.3; 2.7; 3.5; 4.1)</p>	Beyond grade 10 state assessment